

## Rapid Communication

**The twobar seabream, *Acanthopagrus bifasciatus* (Teleostei: Sparidae), in the western Mediterranean Sea: a likely ship-borne introduction**Alfredo García-de-Vinuesa<sup>1,\*</sup>, Antoni Lombarte<sup>1</sup> and Ernesto Azzurro<sup>2</sup><sup>1</sup>Institut de Ciències del Mar, Centro Superior de Investigaciones Científicas (ICM-CSIC), Passeig Marítim de la Barceloneta, 37-49, E-08003 Barcelona, Spain<sup>2</sup>CNR-IRBIM, National Research Council, Institute of Biological Resources and Marine Biotechnologies, Largo Fiera della Pesca, 2, 60125 Ancona, ItalyAuthor e-mails: [agvinuesa@icm.csic.es](mailto:agvinuesa@icm.csic.es) (AG), [toni@icm.csic.es](mailto:toni@icm.csic.es) (AL), [eazzurr@gmail.com](mailto:eazzurr@gmail.com) (EA)

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**Abstract**

On November 2019, a single individual of *Acanthopagrus bifasciatus* was captured along the coast of Barcelona. Its external characteristics were described and morphologically analysed. This record represents the second confirmed observation of this species in the Mediterranean Sea and the first for the western basin. Its detection in a commercial harbour supports the hypothesis of a ship-borne introduction.

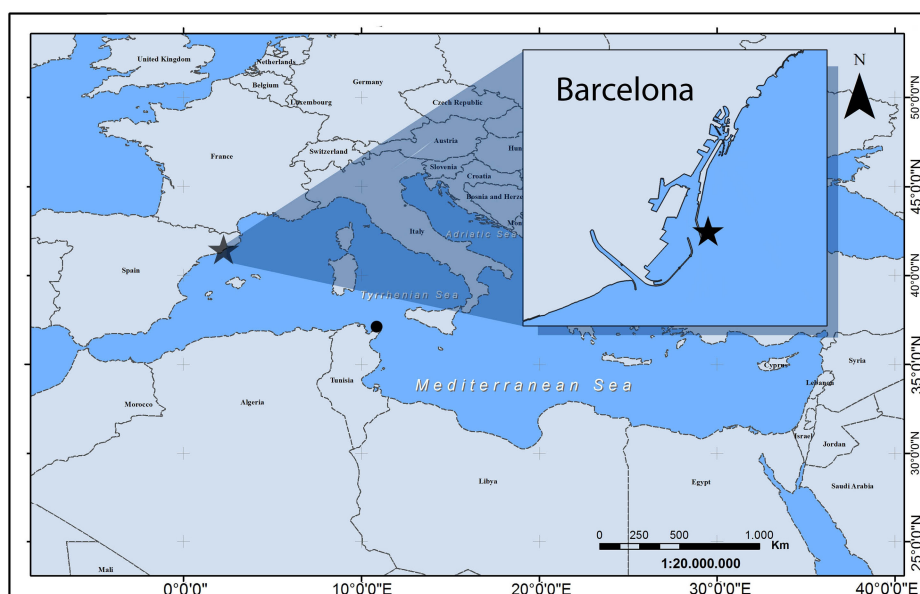
**Key words:** non-indigenous species, Sparidae, ship transport, Mediterranean migration**Introduction**

The timely detection and proper identification of non-indigenous species (NIS) is fundamental for supporting environmental policies at the European and Mediterranean level, as defined by *descriptor 2* of the European Marine Strategy Framework Directive (MSFD; (EU) 2017/848) and *indicator 6* of the Barcelona Convention Integrated Monitoring and Assessment Programme (IMAP). Today, the number of non-indigenous fishes occurring in the Mediterranean Sea is particularly high, especially in the eastern basin, due to the influence of the Suez Canal. Nevertheless, introductions mediated by other vectors, such as aquarium releases and ship transport, are increasingly documented (Zenetos et al. 2017); these occurrences also concern the western basin of the Mediterranean Sea, despite its relatively unsuitable conditions for tropical and subtropical fish invasion (D'Amen and Azzurro 2019).

In this study, we provide the first evidence of the occurrence of a sparid, the “twobar seabream” *Acanthopagrus bifasciatus* Forsskal, 1775, in the western Mediterranean Sea. The native distribution of this species extends to the Red Sea and the western coast of the Indian Ocean (Khalaf and Disi 1997), and at present, evidence for its occurrence in the Mediterranean Sea has been confirmed only once, along the Tunisian coast in 2010 (Ben-Souissi et al. 2014).



**Figure 1.** *Acanthopagrus bifasciatus* a few moments after its capture in Barcelona harbour on November 16<sup>th</sup> 2019. Photo by Luis Barreto Cedeño.



**Figure 2.** Records of *Acanthopagrus bifasciatus* in the Mediterranean Sea: Dot = Ben-Souissi et al. 2014; Star = present study.

## Materials and methods

On November 16<sup>th</sup>, 2019, a single individual of *Acanthopagrus bifasciatus* (Figure 1) was speared in Barcelona harbour (41.3475N; 2.17055E) (Figure 2). The capture was made by a recreational spearfisher at a depth of 10 m from the harbour's breakwater. Immediately after the capture, the same fisher took a picture of the fish, informed the researchers at the Institute of Marine Sciences (ICM-CSIC) of Barcelona and preserved the fish in the freezer.

The frozen fish was recovered by the authors and transported to the ICM-CSIC laboratory. Morphometric measurements and meristic counts were performed on the defrosted fish following methods previously described (Ben-Souissi et al. 2014). Finally, the fish was preserved in 70% ethanol and stored in the biological collection of the ICM-CSIC under the

registration number ICMP001925. A sample of muscle tissue that was preserved in 70% ethanol was used for further analyses.

## Results

The specimen, identified as *Acanthopagrus bifasciatus*, measured 31.5 cm TL and weighed 380.0 g TW. It displayed two black bars on its head; a bright orange spot from the upper jaw up to the forehead; and bright orange dorsal, caudal, and pectoral fins, the first two of which lack black margins. According to gonadal examination, the specimen was a mature male. The following values were obtained using the meristic formula: D, XI + 13; A, III + 10; P, 15; V, I + 5; pored lateral line scales, N = 49; scales above the lateral line, N = 5; and scales below the lateral line, N = 9.

## Discussion

The twobar seabream caught in Barcelona displayed unique taxonomical characteristics (Iwatsuki and Heemstra 2010), and it was easily distinguishable from other species of the same genus, such as *A. latus* and *A. berda*. The morphological characteristics and meristic counts matched those of the individual studied in Tunisia (Ben-Souissi et al. 2014) and the other descriptions of the species reported in the scientific literature (e.g., Khalaf and Disi 1997; Iwatsuki and Heemstra 2010). Therefore, the new observation of *A. bifasciatus* in Barcelona represents evidence of the second occurrence of this species in the entire Mediterranean Sea and adds a non-indigenous species to the 23 native sparids that occur in the Catalan Sea (Nelson et al. 2016). According to the current status of knowledge, this species is not established in the Mediterranean Sea, and until evidence of the contrary is provided, the present observation should be considered an isolated occurrence of a translocated individual. Nevertheless, we cannot exclude that other independent introductions of this species have occurred in the past. There are, for instance, three other Mediterranean records of *A. bifasciatus* reported by GBIF, which require a proper evaluation: one in Egypt (<https://www.gbif.org/occurrence/583446494>) and two from divers, relatively near Barcelona (<https://www.gbif.org/species/2392311>) in 2013 and 2017, respectively.

The probability of an eventual establishment of a self-sustaining population of this tropical species in Mediterranean waters should be carefully evaluated considering the abiotic conditions of the environment (e.g. D'Amen and Azzurro 2019) and the biotic requirements and ecological position of the species within the host community, which may be important predictors of invasion success (Azzurro et al. 2014).

This new record of the “twobar seabream” in a Catalan harbour provides further support for the hypothesis of a ship-borne introduction, as already hypothesized (Ben-Souissi et al. 2014). Indeed, the harbour of Barcelona is one of the main commercial ports of the Mediterranean and is subjected to intense traffic from oceanic vessels (Soriguera et al. 2006). In contrast, the

possibility of the specimen having been introduced from the Suez Canal seems less likely due to the long distance between the canal and the detection points in Spain and Tunisia.

Finally, our findings reinforce the importance of engaging local fishers in the detection of non-indigenous species, a practice that has recently proven to be very effective as a complementary tool in coastal and port surveys (Azzurro et al. 2018). Considering the recognized importance of vessels for the transfer of non-indigenous species (David and Gollasch 2015) and the increasing evidence of non-indigenous fish transport by ships and mobile oil platform structures (e.g. Dulčić and Dragičević 2013a, b), a dedicated risk assessment would be an important subject of study for future research.

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